

Sept. 30, 1941.

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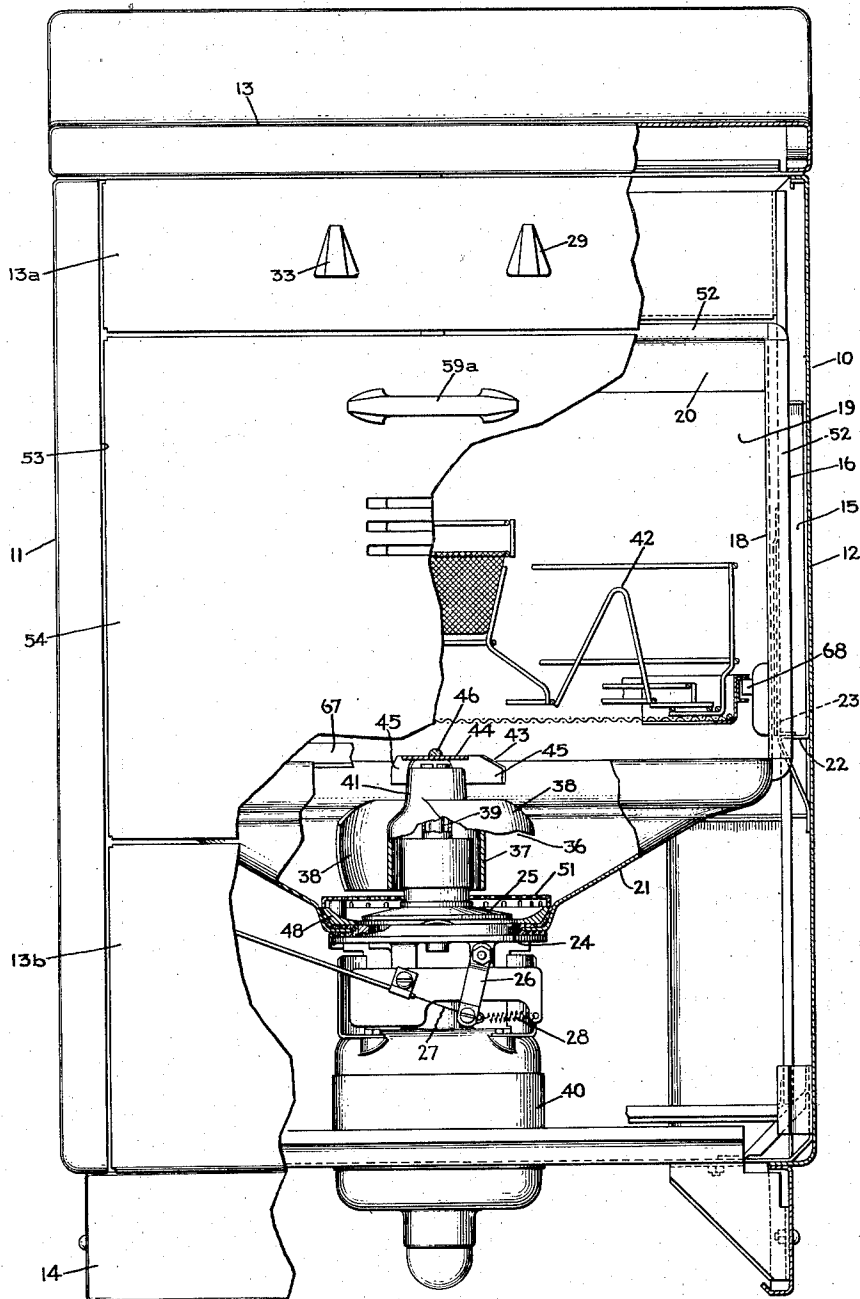
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WASHING APPARATUS

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4 Sheets-Sheet 1

Fig. 1.



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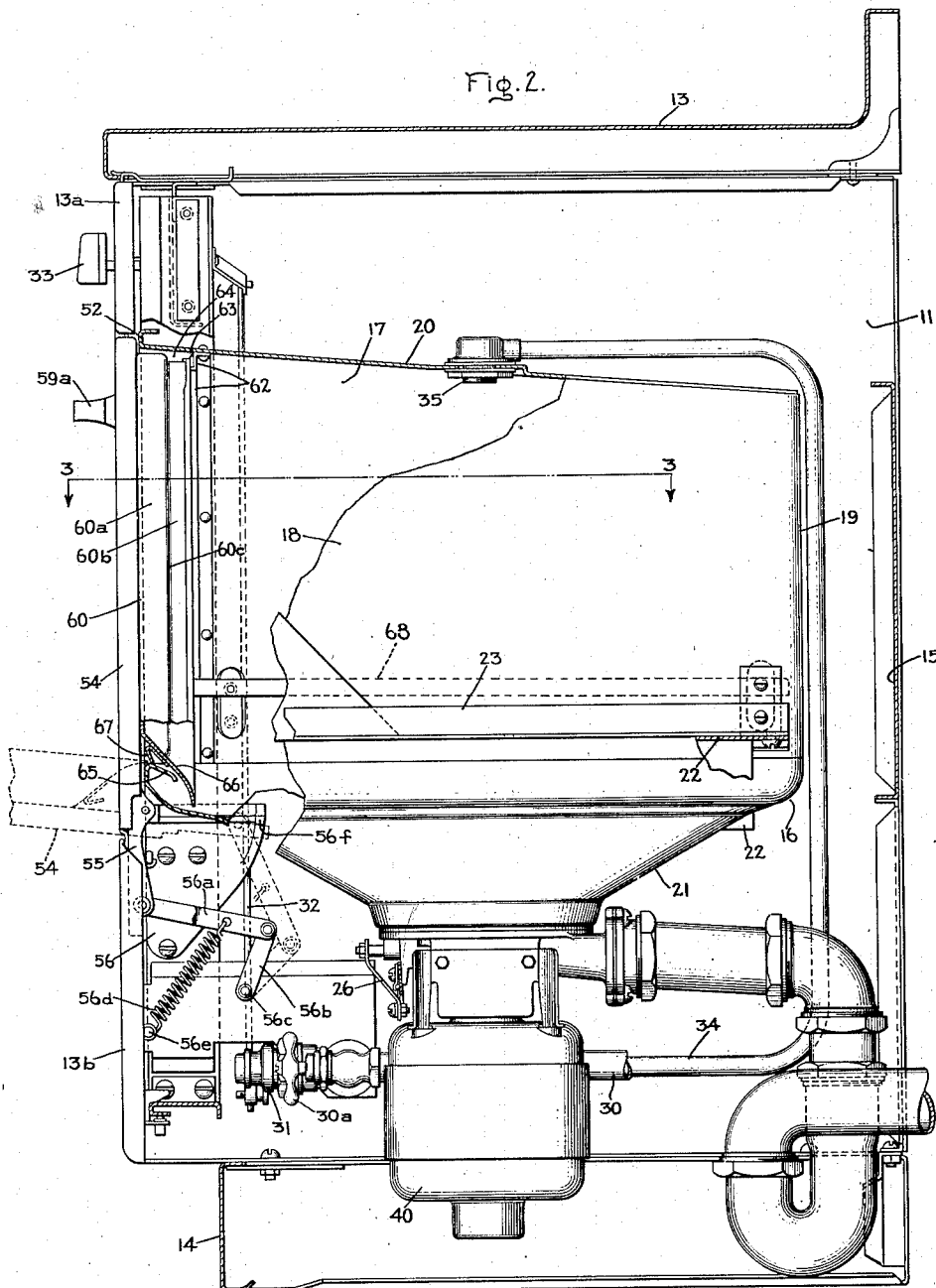
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WASHING APPARATUS

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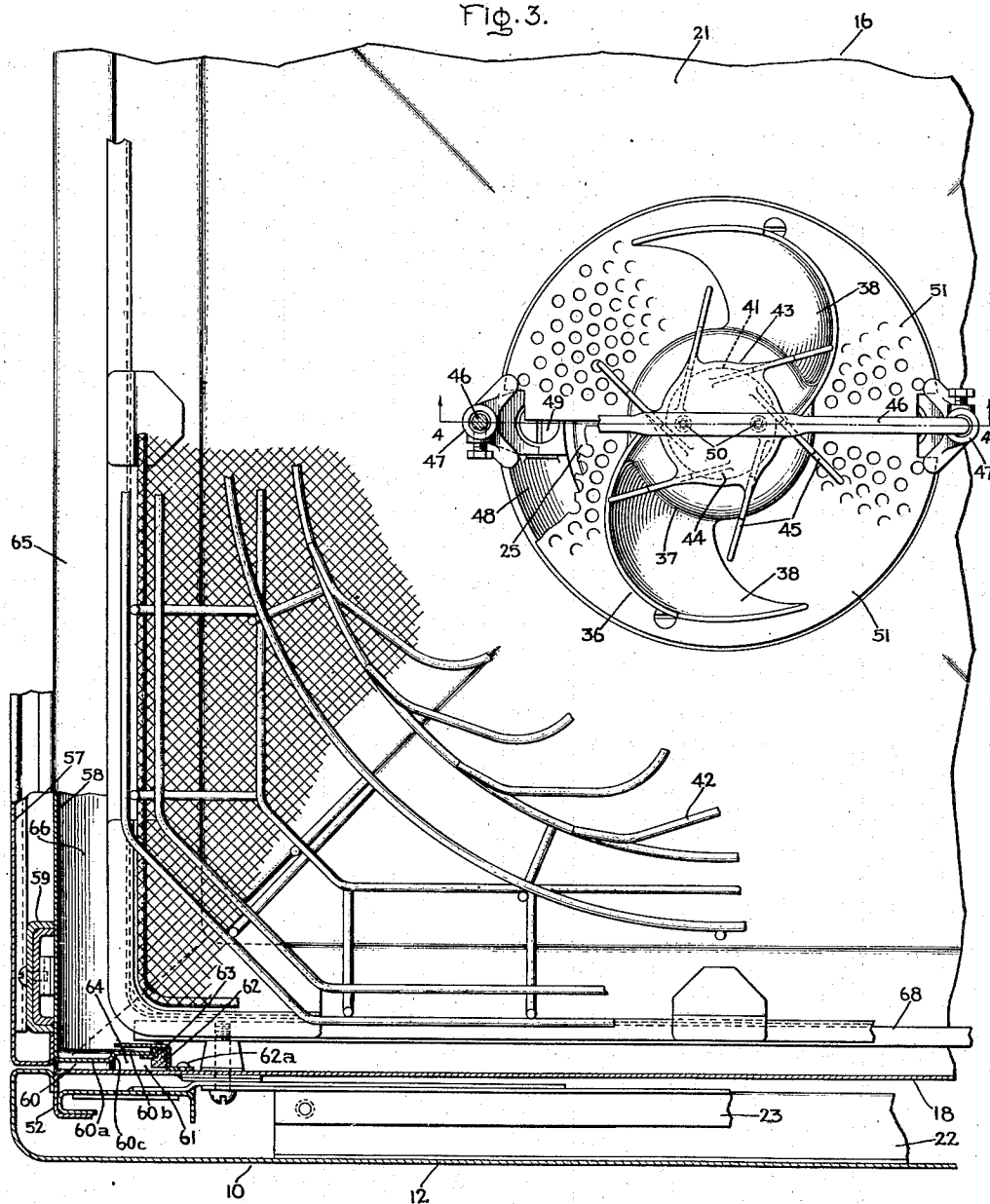
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FIG. 3.



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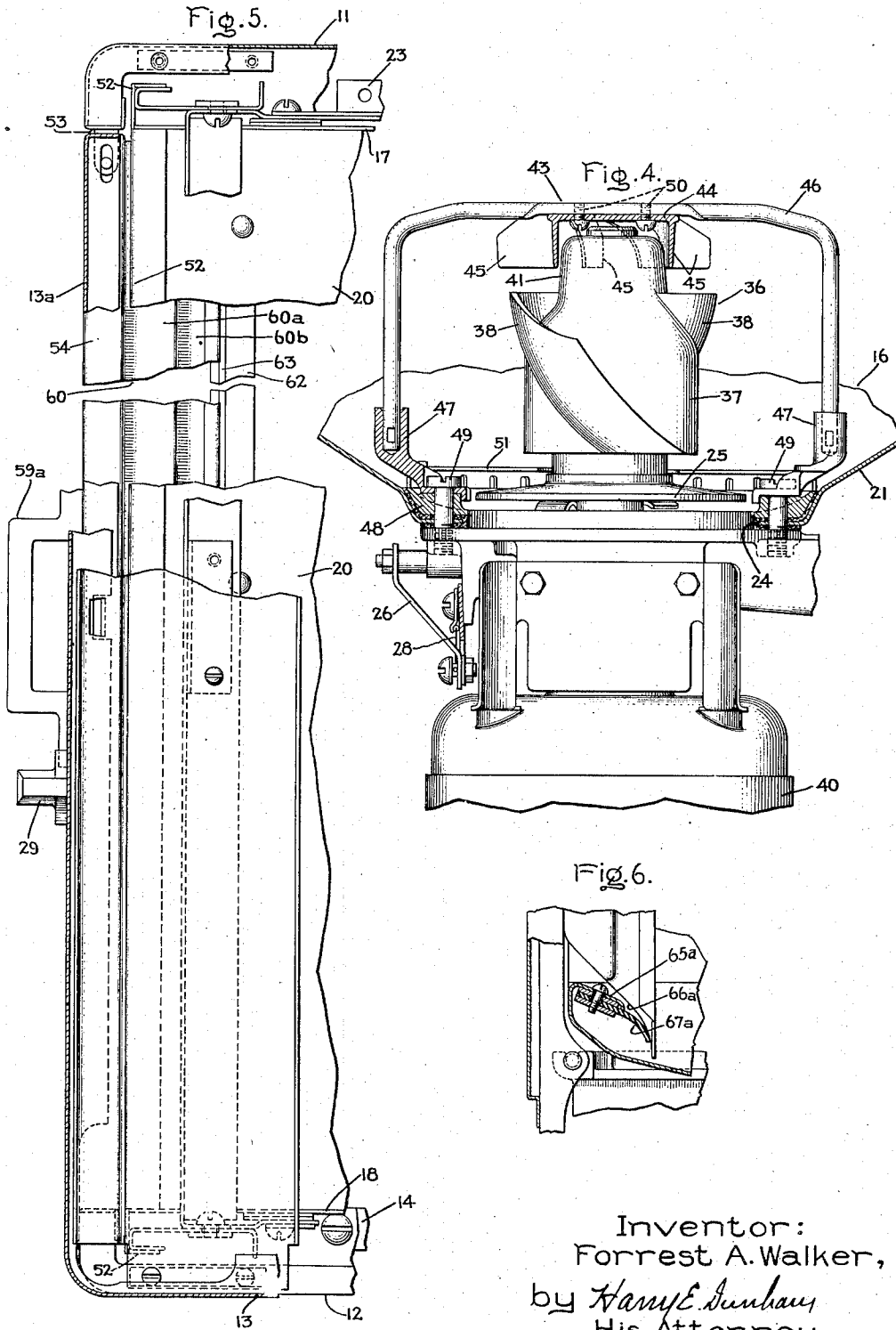
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WASHING APPARATUS

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,257,436

WASHING APPARATUS

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Application August 27, 1937, Serial No. 161,257

3 Claims. (Cl. 220-46)

This invention relates to washing apparatus, more particularly to dishwashing apparatus, and it has for its object the provision of an improved device of this character.

This invention is especially applicable to dishwashers having a front opening providing for the insertion and removal of dishes from the washing vat or chamber, and it contemplates the provision of an improved vat structure including means for sealing the front opening when the door of the apparatus is closed. In addition it contemplates the provision of improved water circulating and distributing means in the washing vat.

In accordance with this invention in one form thereof, the front door is provided with a flange which extends into the vat when the door is closed adjacent the side and top walls of the vat. The portion of the flange nearest the door is fitted relatively close to these walls, whereas the inner portion of the flange remote from the door is positioned a greater distance from these walls. The inner edge of this inner portion is received in a recess provided for it on the side and top walls of the vat, and the parts are so arranged that the inner portion of the flange cooperates with the side and top walls of the vat to define an expansion chamber extending along the sides and top of the door. The air and water spray tending to escape from the vat through the front opening enter this expansion chamber where the pressure is relieved sufficiently to prevent leakage past the door.

Arranged within the vat is a suitable water circulating impeller having blades arranged to engage the water in the vat and circulate it upwardly and outwardly in the vat. Positioned above the impeller is a suitable disc-like supporting member which carries a plurality of water-distributing blades to engage the water in its upward and outward movement to deflect it in predetermined directions so as to obtain an improved water distribution.

For a more complete understanding of this invention, reference should be had to the accompanying drawings in which Fig. 1 is a vertical front elevation of dishwashing apparatus embodying this invention, parts being broken away and parts shown in section so as to illustrate certain details of construction; Fig. 2 is a vertical central sectional view taken through the washing apparatus of Fig. 1; Fig. 3 is an enlarged sectional view taken through the line 3-3 of Fig. 2 and looking in the direction of the arrows; Fig. 4 is an enlarged vertical elevation

taken through the line 4-4 of Fig. 3 and looking in the direction of the arrows, and illustrating the liquid circulating means used in the washing apparatus of Figs. 1 to 3; Fig. 5 is an enlarged fragmentary plan view of a portion of the washing apparatus of Figs. 1 and 2 with parts removed so as to illustrate certain details of construction; and Fig. 6 is a fragmentary view of a modified form of part of the apparatus, a part of the figure being shown in section.

Referring to the drawings, this invention has been shown in one form as applied to a front-opening dishwasher having a cabinet 10 of rectangular form. As shown, this cabinet has side walls 11 and 12 and a top wall 13. Upper and lower wall panels 13a and 13b are provided at the front. At the bottom, the cabinet is supported on a base 14. The rear of the cabinet in the main is open but has its central area closed by means of a baffle or panel 15.

Mounted within the cabinet is a vat 16. The vat 16 also is substantially rectangular having side walls 17 and 18, a rear wall 19, a top wall 20 and a bottom wall 21. The side walls 17 and 18 of the vat are positioned relatively close to the corresponding side walls 11 and 12 of the cabinet, as shown in Figs. 1 and 5, while the remaining walls of the vat are spaced a considerable distance from the corresponding walls of the cabinet.

Mounted within the spaces between the side walls of the vat and cabinet are supporting brackets 22 secured to the side walls of the cabinet in any suitable manner, as by welding. These brackets are positioned horizontally, as shown, and extend from the front toward the rear of the cabinet. Mounted on the side walls of the vat are horizontal supporting arms 23 extending from the front to the rear of the vat and resting on the brackets 22 so as to support the vat in the cabinet.

The bottom wall 21 of the vat, as shown, tapers downwardly toward the center where a drain opening 24 is provided. This opening is controlled by means of a drain valve 25, the operation of which between its closed and opened positions is controlled by a lever 26. When the lever 26 occupies its position shown in Fig. 1, the drain valve is open. The lever is held in this position by a cable 27 which is tensioned by a spring 28. The cable 27 extends upwardly in the cabinet to a control knob 29 which operates the cable through suitable mechanism (not shown) to tension it to hold the valve open and to release the

cable to permit the drain valve to close, when desired.

Cleansing liquid, such as hot water, is supplied to the vat through a suitable supply conduit 30 which is controlled by a manually operable valve 30a, and an automatic valve 31 which is of the self-closing type and which is opened by means of a control rod 32 operated by a control knob 33 through suitable mechanism (not shown). The valve 31 is connected with the vat by means of a conduit 34 which extends upwardly and across the top wall of the vat to substantially its central part where it communicates with the interior of the vat through a suitable spray nozzle 35.

Positioned within the downwardly tapered bottom wall 21 is a suitable water circulating impeller 36 having an apron-like supporting member 37 carrying upon its exterior surface a plurality of water engaging and circulating blades 38. Extending upwardly through the drain valve and into the apron 37 is a shaft 39 driven by an electric motor 40 supported below the bottom wall of the vat. The apron 37, as shown, tapers upwardly and inwardly to a section 41 of smaller diameter which extends above the upper edge of the liquid circulating blades 38. It will be understood that the impeller blades when rotated are arranged to engage the water that is supplied to the vat so as to project it upwardly and outwardly in a whirling mass.

Positioned in the vat above the impeller is a suitable open-work dish and utensil supporting tray 42 which may have any suitable construction, but preferably will be substantially of the same arrangement as is the lower rack described and claimed in my United States Patent No. 2,035,625, dated March 31, 1936.

Positioned above the impeller is a water distributing member 43 which comprises a plate or disc-shaped member 44 supported over the impeller, as clearly shown in Figs. 3 and 4. Integral with the disc member 44 are a plurality of vanes or blades 45 extending outwardly and downwardly from the disc tangentially to a circle slightly larger than the upper portion 41 of the apron 37 as shown in Fig. 3, and spaced at intervals circumferentially of the disc. These vanes are vertically positioned, and they extend outwardly over the impeller blades 38 so that the water hurled upwardly and outwardly by these blades engages the vanes 45 which redistributes the water by sending a portion of it more directly upwardly in the vat than does the impeller itself. The purpose of the distributing vanes 45 is to cause the whirling mass of water to be spread substantially uniformly over the area of the dish-supporting tray 42.

Straddling the impeller is a U-shaped supporting bracket 46 having the lower ends of its legs supported in standards 47 that are secured in the bottom wall 21. For this purpose, the standards 47 are mounted upon a suitable ring-shaped member 48 that surrounds the drain valve 25, the standards seating on the ring and being secured thereto by screw fastening means 49. The disc member 44 is secured to the bracket 46 by means of screw-fastening means 50.

Positioned over the drain valve is a stationary straining screen 51.

As shown in Figs. 1, 2 and 3, the vat 16 is open at the front and the outer edges of the vertical side and top walls of the vat surrounding the front opening are flanged outwardly and thence turned back upon themselves, as clearly shown

in Figs. 2 and 3; these outwardly extending flanges define a marginal flange 52 about the sides and top of the opening. The cabinet 10 at the front is provided with an opening 53 between the upper and lower panels 13a and 13b and opposite the front opening in the vat. The opening 53 is closed by a door 54 which is hinged at its lower edge to swing on a horizontal axis outwardly at the top to a horizontal open position shown in dotted lines in Fig. 2. The door is provided with hinge arms 55 which are pivotally mounted on hinge brackets 56. The arms 55 extend below the pivotal point of suspension of the door and at their lower ends are pivotally connected to links 56a which, in turn, are pivotally connected to links 56b. The links 56b are arranged to move on fixed pivotal supports 56c. Tension springs 56d are provided having one end connected to the links 56a between the ends of the links, preferably off their center toward the connection of the links with the links 56b, and their other ends anchored to fixed pins 56e. When the door is opened, as shown in dotted lines in Fig. 2, the links are moved to their dotted line positions which tensions the springs to counter-balance the weight of the door. Stops 56f are provided on the hinge brackets 56 to engage the arms 55 to limit the opening movement of the door.

As shown, when the door is closed the side and top marginal edges of the door substantially about the marginal flange 52. Preferably, the door will be of the construction described and claimed in the copending application of F. A. Walker and E. S. Stoddard, S. N. 161,258, filed August 27, 1937, assigned to the same assignee as this invention, and which has matured into Patent No. 2,157,943, dated May 9, 1939. As there described in detail, the door is provided with outer and inner panels 57 and 58 (Fig. 3) which are mounted upon a suitable structural supporting framework 59. A handle 59a is provided for the door.

In accordance with this invention, the door is provided with an inwardly extending flange 60 which preferably will be formed integrally with the inner panel 58, as clearly shown in Fig. 3. The flange 60 when the door is closed extends for a material distance into the vat, as shown in Figs. 2 and 3, and it also extends along the vertical side and top edges of the door. The flange is divided into two portions 60a and 60b spaced at different distances from the associated walls of the vat, and joined together by a shoulder 60c. The outer portion 60a is adjacent the door and is fitted relatively closely to the corresponding side and top walls of the vat, while the inner portion 60b of the flange is spaced a greater distance from them. The inner edge of the inner portion 60b is received in a channel-like recess 61 which is defined by Z-shaped bars 62 secured to the side and top walls of the vat; as shown, one leg of the Z-bar is rigidly secured to the associated wall of the vat in any suitable manner, as by bolts 62a, while the opposite leg is positioned to overlap the inner edge of the associated flange portion 60b. In the specific example shown, a soft rubber sealing member 63 extends through the length of the recess and is fitted to the outer and bottom walls thereof, as shown in Fig. 3, so as to be engaged by the inner edge of the flange portion 60b when the door is closed. This sealing member 63, however, is not necessary. If it is not used, however, the walls

of the channel 62 should fit the flange portion 60b fairly closely.

It will be observed in view of the foregoing arrangement that when the door 54 is closed, the inner flange portion 60b, the portions of the side and top walls of the vat opposite it, the channel member 62 and the shoulder 60c between the two flange portions 60a and 60b define an open chamber 64 extending along the sides and top of the door. This constitutes an expansion or pressure relief chamber and may aptly be termed a dead air space. It will be understood that in the operation of the device, when water is being supplied to the vat, and particularly when it is being supplied to the vat while the impeller 36 is operating, a pressure is built up in the vat which tends to force the air and water spray out through the front of the apparatus. The water spray and air thus forced forwardly passes the inner end of the flange portion 60b and enters the enlarged chamber 64 where the pressure is immediately released. When the pressure is released, the water contained in the air flows down through the chamber 64 and drops into the vat at the bottom.

Leakage is prevented at the bottom edge of the door by means of a lip 65 (Figs. 2 and 3) formed on the bottom wall 21 of the vat and extending across the lower edge of the front opening. This lip is inclined downwardly somewhat as shown in Fig. 2. The door at the bottom is provided with a similar lip 66 which is curved inwardly and downwardly of the vat, as shown in Figs. 2 and 3. This lip 66 extends down over the lip 65 and is relatively elongated so that irrespective of the position of the door between its fully opened and fully closed positions, it will overlie at least a part of the lip 65. Also carried by the bottom of the door is a sealing member 67 shown as a hairpin-shaped spring member having one leg secured to the under side of the door and its other leg arranged to substantially engage the top surface of the lip 65 when the door is closed. This effects an effective seal at the bottom of the door.

In Fig. 6 there is shown a modified form of door seal at the bottom. As shown in this form, there is located between the inturned lip 65a on the vat and the lip 66a on the door, a flat flexible rubber strip 67a. This is bolted to the lip 65a, as shown, and is arranged to yieldingly engage the lips 66a when the door is closed to seal the door.

The means of the first form of the invention for preventing leakage at the bottom of the door comprising the lip 65 on the vat, the lip 66 on the door, and the sealing member 67 secured to the lip 66, and the corresponding means of the second form of the invention comprising the lip 65a on the vat, the lip 66a on the door and the flexible rubber strip 67a on the lip 65a are described and claimed in my copending application, Serial No. 383,076, filed March 13, 1941, which is a division of this application.

The tray 42 is mounted upon suitable brackets 68 in the sides of the vat whereby when the front door 54 is opened, the rack may be withdrawn through the front for loading and unloading the dishes and utensils to be washed. It will be observed that the lip 66 has the further function of preventing soiled food particles and the like which collect on the door when the soiled dishes are loaded from dropping out through the front of the apparatus when the door is closed. Food particles that collect on

the door are washed off and directed downwardly into the bottom wall 21 of the vat when the apparatus is operated.

Preferably and as shown, the upper wall 20 of the vat will be inclined from the upper edge of the front opening toward the rear and at such an angle that water particles and the like will not collect on the top wall, but will flow to the rear and down the rear wall of the vat. This is an important feature in that it prevents water that has been projected onto the top wall from collecting on it and dripping down into the vat and onto the cleansed dishes either when left in the vat or when withdrawn from it.

While I have shown particular embodiments of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In dishwashing apparatus, a vat forming a washing chamber having a front opening therein defined in part by the side and top walls of the vat, a door for closing said opening arranged to swing on an axis at its lower edge, a flange extending inwardly from the side and top edges of the door, a member carried by the side and top walls of the vat and cooperating with them to define a channel that receives said flange when the door is closed, the outer portion of the said flange adjacent the door fitted relatively close to the side and top walls of the vat, and the inner portion spaced farther from said walls and close to the inner wall of the recess so as to define an open expansion chamber extending vertically at the two sides and across the top of the door in which the pressure of fluids forced through said opening is released, the lower ends of the portion of said expansion chamber at the sides of the door opening into the lower portion of said vat.

2. In dishwashing apparatus, a vat forming a washing chamber having a front opening therein defined in part by the side and top walls of the vat, a door for closing said opening arranged to swing on an axis at its lower edge, a flange extending inwardly from the side and top edges of the door, a member carried by the side and top walls of the vat and cooperating with them to define a U-shaped recess that receives said flange when the door is closed, the outer portion of the said flange adjacent the door fitted relatively close to the side and top walls of the vat, and the inner portion spaced farther from said walls and close to the inner wall of the recess so as to define an open expansion chamber extending vertically at the two sides and across the top of the door, the portions of said expansion chamber at the sides of the door opening at their lower ends into the lower portion of said vat, and a resilient sealing member in said recess engaging the inner end of the flange.

3. In dishwashing apparatus, a vat forming a washing chamber having a front opening therein, a door for closing said opening arranged to swing on an axis at its lower edge, an elongated flange extending inwardly from each of the side and top edges of the door, each flange being formed into two portions, each of which is substantially parallel to the wall of said vat associated with it, the portion of each flange

adjacent said door fitting relatively closely to said associated wall and the inner portion removed from said door spaced farther from said wall than said portion adjacent said door, a shoulder joining said two portions of each flange, a member on said side and top walls defining a channel into which said inner portions of said

flanges are received, the enlarged space in said channel defined by said inner flange portions, said member, and associated vat walls forming an expansion chamber at the side and top of said door for liquids forced from said vat.

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